Space Weather Forecast

Issued on Monday, 16 January 2023 at 13:22 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Further Minor/Moderate Radio Blackouts (R1/R2) expected. Risk of G1/Minor Geomagnetic Storm rising from midweek.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the last 24 hours, with one solitary M-class flare observed, a long-duration event from a large sunspot in the southeast.

The solar disc remains highly congested in terms of sunspot regions, particularly the eastern solar horizon, with 10 sunspots at present, a number of which are moderately large and complex.

No new Earth-directed Coronal Mass Ejections (CMEs) have been observed in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind showed a slight decreasing trend from 470 km/s initially to around 420 km/s by 15/1800 UTC, followed by an increase to a peak of 534km/s at 16/0324 UTC. A subsequent steady decrease to 450-480km/s was then observed by the end of the period. This was attributable to the ongoing waning effects of a Coronal Hole High-speed stream, superimposed with a CME arrival towards the end of the UTC day on the 15th. The Interplanetary Magnetic Field was moderate levels initially, increasing until around 15/2300 UTC, followed by a somewhat erratic drop to mainly weak levels following this. The important north-south direction was weak to moderately negative until around 15/2300 UTC, after which it has become mostly weakly positive. Subsequent Geomagnetic activity was Unsettled to Active (Kp3-4) with a G1/Minor Storm (Kp5) interval 15/2100-2359 UTC.

Energetic Particles / Solar Radiation: No solar proton storms were observed through the period.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is Expected to be Low-Moderate, with a daily slight chance of Strong-class flares. Although one of the more active regions departs the front side by midweek UTC, the sheer weight of current and expected eastern solar hemisphere arrivals should serve to compensate.

Solar Wind / Geomagnetic Activity: Solar wind speeds are expected to ease through Day 1 and 2 (16th/17th) due to fading Coronal Hole and Coronal Mass Ejection effects, but remain at slightly elevated levels. Day 3 (18th) may see wind speeds rise to 450-500km/s due to one or more faint Coronal Hole high-speed streams. By Day 4, connection to another high-speed stream may take place with winds increasing to around 500-500km/s (elevated). There is then the risk of a CME from the AR3182 twin M-flares of 14th January arriving later day 3 or day 4 (18th or 19th).

Quiet to Unsettled geomagnetic activity is expected through the remainder of Day 1 and into Day 2. Activity should become Unsettled to Active later on Day 3, before increasing to Active to G1/Minor Storm levels into Day 4 for a time, before easing later.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

Energetic Particles / Solar Radiation: The chances of solar radiation storms are likely to remain at predominantly background levels, but with a slight chance of enhancements which could produce an S1 or greater event through the period due to the number of magnetically complex sunspot regions.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

Met Office

Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	5	1	40	60
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	80	80	80
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.